

Appl. No. 09/271,411  
Amdt. dated February 15, 2008  
Reply to Office Action of October 18, 2007

PATENT

REMARKS/ARGUMENTS

**I. STATUS OF THE CLAIMS**

Claims 60, 62-70 and 72 are pending. With entry of this amendment, claims 45-55, 57, 58 and 71 are canceled. Dependent claim 72 is new. Support for new claim 72 can be found throughout the specification. For example, at page 9, lines 4-11 of the specification. No new matter is added.

**II. REJECTIONS UNDER 35 U.S.C. §103(a)**

**A. Claims 45-50, 52-55, 57, and 58 are canceled, rendering the rejection moot.**

Claims 45-50, 52-55, 57, and 58 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Handique (U.S. Pat. No. 6,130,098) in view of Wilding (U.S. Pat. No. 5,587,128), and in view of Ramsey (U.S. Pat. No. 6,033,546).

Applicants note that with entry of this amendment claims 45-50, 52-55, 57, and 58 are canceled, rendering the rejection to these claims moot.

In light of the above, Applicants request that the Examiner withdraw the rejection.

**B. Claim 51 is canceled rendering the rejection moot.**

Claim 51 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Handique (U.S. Pat. No. 6,130,098) in view of Wilding (U.S. Pat. No. 5,587,128), in view of Ramsey (U.S. Pat. No. 6,033,546), and in further view of Burns (U.S. Pat. No. 6,379,929).

Applicants note that with entry of this amendment, claim 51 is canceled, rendering the rejection to this claim moot.

In light of the above, Applicants request that the Examiner withdraw the rejection.

**C. Claim 71 is canceled rendering the rejection moot.**

Claim 71 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Handique (U.S. Pat. No. 6,130,098) in view of Wilding (U.S. Pat. No. 5,587,128), and in further view of Manz (U.S. Pat. No. 5,599,432).

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Applicants note that with entry of this amendment, claim 71 is canceled, rendering the rejection to this claim moot.

In light of the above, Applicants request that the Examiner withdraw the rejection.

**D. Claims 60 and 62-70 are patentable and not obvious over Handique in view of Wilding**

Claims 60 and 62-70 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Handique (U.S. Pat. No. 6,130,098) in view of Wilding (U.S. Pat. No. 5,587,128). The Examiner alleges that Handique discloses, *inter alia*, an invention directed to the movement and mixing of microdroplets through microchannels in devices with reaction chambers, etc. See, page 7 of the Office Action, *citing* col. 3, line 39 through col. 4, line 32 of Handique. The Examiner acknowledges, however, that Handique does not teach optically monitoring the reaction chamber for product. The Examiner relies on Wilding as curing this defect in Handique. Specifically, the Examiner cites Wilding as teaching devices for microscale reaction-analysis comprising a reaction chamber, a transition region and a separation region as described above for Handique. In addition, Wilding is cited as teaching optical monitoring of reaction product before entering into the separation region. See, page 8, last paragraph to top of page 9 of the Office Action, *citing* col. 19, lines 31-37 of Wilding *et al.* To the extent that rejection applies to the claims as presently amended, Applicants disagree.

**1. The cited references do not teach nor suggest a device having a valve as presently claimed in independent claim 60.**

Applicants submit that independent claim 60 is patentable over Handique *et al.* alone or in combination with Wilding *et al.*, because the combination of these references does not teach or suggest a method using a device having at least one valve in a transition region for controlling fluid flow between a reaction chamber and a separation region as recited in independent claim 60.

In contrast to the invention as presently claimed, Fig. 1 of Handique *et al.* teaches a device having a reaction chamber connected to an electrophoresis module, but no valve is shown in the region connecting the reaction chamber to the electrophoresis module. In fact,

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there are no valves shown in Fig. 1. Where Handique shows a valve in the device of Fig. 13. Specifically, Fig. 13 of Handique shows a device having a valve in a side channel connecting to a main channel. The device shown in Fig. 13, however, lacks a reaction chamber or electrophoresis module. Thus, the mere showing of a valve in a side channel in the device of Fig. 13 does not teach nor suggest the Applicants' method as recited in independent claim 60. There is no showing in Fig. 13, or anywhere else in Handique, of a valve in a transition region for controlling fluid flow between a reaction chamber and a separation region, as recited by applicants in claim 60. The placement of a valve in a side channel of the device of Fig. 13 does not teach or suggest the placing of a valve in the region of the different device of Fig. 1 that connects the reaction chamber to the electrophoresis module as alleged by the Examiner. Furthermore, Wilding does not cure this defect in Handique, because Wilding does not teach nor suggest a method using a device having at least one valve in a transition region connecting the reaction chamber to the separation chamber as presently claimed.

Independent claim 60 is patentable over Handique, in view of Wilding, because the cited references do not teach or suggest a device having a valve in a transition region that connects a reaction chamber to a separation region, as presently claimed.

Moreover, Handique teaches away from using valves in the device of Fig. 1. In the section of the specification (Col. 13, lines 61-66) following the description of Fig. 1, when describing how discrete droplets are created and moved through the device, Handique teaches that:

The present invention contemplates methods, compositions and devices for the creation of microdroplets of discrete (i.e. controlled and predetermined) size. The present invention contemplates the use of selective hydrophobic coatings to develop a liquid-sample injection and motion system that does not require the use of valves. (Emphasis added)

Thus, Handique fails to teach or suggest a method where there should be any valves used in the device of Fig. 1, much less a method with a valve in the transition region that is closed while a sample is reacted in the reaction chamber and opened before injecting a sample plug into the separation region, as explicitly recited by applicant in claim 60.

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**2. The cited references do not teach all of the method steps as presently recited in independent claim 60**

As discussed above, neither Handique nor Wilding teach or suggest a method using a device having a valve as recited in independent claim 60. In particular, the references do not teach nor suggest the steps of subjecting the sample to a reaction while the valve is closed as recited in step (b) of claim 60, nor do the references teach opening the valve before injecting a sample plug into the separation region, as recited in steps (e) and (f) of independent claim 60.

The rejection is improper because neither Handique, nor Wilding alone, or in combination, teach or suggest the steps of subjecting the sample to a reaction while the valve is closed as recited in step (b) and then opening the valve before injecting a sample plug into the separation region, as recited in steps (e) and (f) of independent claim 60. Therefore, independent claim 60 is patentable and not obvious in light of the cited references.

In light of the arguments as presented above, Applicants request that the Examiner withdraw the rejection.

**3. Wilding does not teach nor suggest the use of optically monitoring the reaction chamber for reaction product.**

The Examiner acknowledges that Handique does not teach nor suggest the step of optically monitoring the reaction chamber for products. The Examiner, however, relies on Wilding for curing the defects in Handique. Specifically, the Examiner alleges that Wilding teaches optical monitoring of reaction product before entering into the separation region. See, page 9, of the Office Action, citing col. 19, lines 31-37 of Wilding. Applicants disagree.

Although Wilding does mention that a video camera and screen allow changes in sample fluid properties, such as color induced by polynucleotide amplification, to be monitored visually and optionally recorded (see, col. 19, lines 31-37), Wilding, does not teach or suggest the specific method steps as presently recited in independent claim 60. Specifically, Wilding does not teach or suggest optically monitoring the reaction chamber and determining if sufficient reaction products have been generated prior to injecting the sample plug into the separation region and then separating and detecting the reaction products as presently recited in independent claim 60.

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Applicants' method, as recited in claim 60, provides important advantages, such as super or control of fluid between a reaction chamber and separation region. For example, high internal pressure can develop in a reaction chamber due to the thermal expansion of liquid or gas present in the chamber, the generation of gas bubbles, or the chemical reactions performed inside of the chamber. This pressure, combined with any elevated temperatures within the chamber, can cause the unwanted flow or diffusion of chemicals from the reaction chamber into the separation channel. Applicants' method of using a valve in the transition region overcomes this problem. In addition, applicants' method provides for more efficient and reliable testing of samples by optically monitoring the reaction chamber to determine if sufficient reaction products have been generated prior to injecting the sample plug into the separation region.

Because Wilding does not teach or suggest the step of optically monitoring the reaction chamber as presently claimed, Wilding does not cure the defects in Handique. Therefore, independent claim 60 is patentable over Handique in view of Wilding.

Claims 62-70 and 72 depend either directly or indirectly from independent claim 60 and therefore include all of the limitations of independent claim 60. The arguments as presented above, are therefore also applicable to the dependent claims.

In light of the claims as presently recited, and the arguments presented above, Applicants request that the Examiner withdraw the rejection.

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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



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